

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1. (Currently Amended) A method, comprising:
obtaining scatterometry signals by performing scatterometry measurements on ~~at least two~~ a plurality of grating structures with different process responses, ~~said at least two~~ plurality of ~~gratings structures being located within the same field and in close proximity to one another~~ each grating structure having a first grating parameter and the grating structures having different values for the first grating parameter;
comparing scatterometry signals from said ~~at least two~~ different grating structures in order to ascertain information about one or more process parameters used to form said ~~at least two~~ grating structures; and
controlling said one or more process parameters based on said comparison, wherein the differences between process responses are attributable at least in part to the differences between the different values for the first grating parameters and wherein the different values for the first grating parameters are selected so as to cause different process responses under the same process parameters.
2. (Currently Amended) The method as recited in claim 1 wherein the step of comparing comprises:
determining the difference between scatterometry signals from said ~~at least two~~ plurality of grating structures.
3. (Currently Amended) The method as recited in claim 2 wherein the step of comparing further comprises:
determining the effective values of said one or more process parameters by comparing the difference between scatterometry signals to calibration data.
4. (Original) The method as recited in claim 3 wherein the step of controlling comprises:
controlling said one or more process parameters in accordance with the effective values of said one or more process parameters.

5. (Original) The method as recited in claim 3 wherein the calibration data is in the form of one or more equations, graphs or libraries.
6. (Currently Amended) The method as recited in claim 3 wherein the calibration comprises:
performing scatterometry measurements on a plurality of sets of grating structures with different process responses for varying process conditions;
calculating the difference between the scatterometry signals for each set of grating structures;
mapping the differences between the scatterometry signals for each set of grating structures as a function of the varying process conditions.
7. (Currently Amended) The method as recited in claim 2 wherein the step of comparing further comprises:
determining if the difference between scatterometry signals is within a predetermined control limit.
8. (Currently Amended) The method as recited in claim 7 wherein the step of controlling comprises:
controlling said one or more process parameters in accordance with whether or not the difference between scatterometry signals is within said predetermined control limit.
9. (Currently Amended) The method as recited in claim 2 wherein the different scatterometry signals are subtracted from one another in order to produce a one or more difference signals.
10. (Currently Amended) The method as recited in claim 9 wherein ~~[[a]]~~ one or more difference ~~property is~~ properties are obtained from the one or more difference signals.
11. (Currently Amended) The method as recited in claim 10 wherein the one or more difference signals or some property thereof are ~~is~~ compared to calibration data in order to determine the effective values of one or more process parameters.

12. (Currently Amended) The method as recited in claim 1 further comprising:
forming said ~~at least two or more~~plurality of grating structures with different process responses on a wafer with a mask.
13. (Original) The method as recited in claim 1 further comprising:
designing a mask with two or more masking structures, each of which is configured to produce a grating structure that responds differently to one or more process parameters.
14. (Currently Amended) A method for controlling one or more process parameters, comprising:
obtaining scatterometry signals for a first grating structure with a first process response and a second grating structure with a second process response different from the first process response~~at least two grating structures~~, each of the grating structures being configured with different sensitivities to one or more process parameters which are desired to be controlled;
comparing scatterometry signals of the first and second grating structures, each of the ~~scatterometry targets~~ first and second grating structures producing different scatterometry signals for a given set of process parameters; and
extracting information about one or more process parameters of the given set of process parameters based on said comparison, wherein the first grating structure and the second grating structure each has a first grating parameter and wherein a first value of the first grating structure's first grating parameter differs from a second value of the second grating structure's first grating parameter and wherein the difference between the first process response and the second process response is attributable at least in part to the difference between the first value and the second value.
15. (Currently Amended) A method of determining optimal or best focus, the method comprising:
forming a target group at a plurality of focus settings, the target group containing ~~two or more~~a plurality of targets with different sensitivities to focus, each target having a first parameter and the plurality of targets having different values for the first parameter, wherein the differences in sensitivities are attributable at least in part to the differences between the different values and wherein the different values are selected so as to cause different process responses under the same process parameters;
obtaining scatterometry signals for each of the targets in the target groups;

calculating difference signals for each target group;
forming a relationship between the difference signal or a property of the difference signal to the focus settings; and
extracting optimal or best focus using the relationship.

16. (Original) The method as recited in claim 15 further comprising:
calculating a property for each of the difference signals.

17. (Original) The method as recited in claim 16 wherein the property is calculated using root mean squared difference

18. (Currently Amended) A process control method, comprising:
measuring two or more measurable patterns that are configured with different process responses so as to produce different scatterometry signals for a given set of process conditions, each pattern having a first parameter and the measurable patterns having different values for the first parameter; and
extracting information about one or more process parameters associated with a photolithographic process by analyzing the differences between the different scatterometry signals from the measurable patterns for a given set of process conditions, wherein the differences between the process responses are attributable at least in part to the differences between the different values and wherein the different values are selected so as to cause different process responses under the same process conditions.

19. (Currently Amended) A target group, comprising:
~~two or more~~ a plurality of scatterometry targets configured to have different process responses, each target having a first parameter, the two or more plurality of scatterometry targets having different values for the first parameter ~~targets being located within the same field and in close proximity to one another,~~ the scatterometry targets with different process responses producing different scatterometry signals, the differences in the scatterometry signals being attributable at least in part to one or more process parameters used to create the scatterometry targets, wherein the differences between the process responses is attributable at least in part to the differences between the different values and wherein the different values are selected so as to cause different process responses under the same process conditions.

20. (Previously presented) The target group as recited in claim 19 wherein the scatterometry targets are grating structures, a first grating structure including a first grating parameter having a first value formed from a first sensitivity to a process parameter, a second grating structure including the first grating parameter having a value formed from a second sensitivity to the process parameter.
21. (Original) The target group as recited in claim 20 wherein the second sensitivity is greater than or less than the first sensitivity.
22. (Original) The target group as recited in claim 20 wherein the grating structures are printed on the surface of a workpiece, the surface representing an exposed layer of photoresist, a partially developed layer of photoresist, a developed layer of photoresist, or an underlayer of the workpiece.
23. (Original) The target group as recited in claim 20 wherein the grating structures are located within the scribeline, device structure or within both the scribeline and the device structure.
24. (Original) The target group as recited in claim 20 wherein the grating structures are periodic in one direction or two directions.
25. (Original) The target group as recited in claim 20 wherein the first and second grating structures have the same pitch, but different linewidths or diameters.
26. (Original) The target group as recited in claim 20 wherein the grating structures are both positive tone or negative tone.
27. (Original) The target group as recited in claim 20 wherein at least one of the grating structures is a positive tone and the other is a negative tone.
28. (Original) The target group as recited in claim 20 wherein the first and second grating structures have the same pitch in both the x and y directions, but different optical proximity corrections (OPC).

29. (Original) The target group as recited in claim 20 at least one of the grating structures includes segmented lines.
30. (Original) The target group as recited in claim 29 wherein the first and second grating structures have the same pitch, but different segment widths.
31. (Original) The target group as recited in claim 29 wherein the first and second grating structures have the same pitch, but different shape segments.
32. (New) The method of claim 14, wherein the first grating structure and the second grating structure were formed under substantially the same process parameters.
33. (New) The method of claim 18, wherein some of the patterns are formed under substantially the same process conditions and some of the targets are formed under substantially different process conditions.